

1. [Amended] An ultrasonic motor comprising:  
a disc of electro-active material (7,11) for producing radial vibrations;  
at least one flexensional displacement amplifier diaphragm (6a,6b,13) for converting the radial vibrations into vibrations of the diaphragm (6a,6b,13) perpendicular to the plane of the disc (7,11), the diaphragm mounted on the disk;  
a rotor (4,4a,4b,14) coupled to the diaphragm, the diaphragm vibrations then being converted into rotary motion via frictional contact at a diaphragm/rotor interface (6b/4,11/14);  
elastic fins (5,5a,5b) each having a fin tip which contacts the friction interface such that, the fin tip has an instantaneous rotation about a rotation point not in line with the fin tip contact point in the direction of rotation, thus causing a horizontal friction reaction which drives the rotor (4,4a,4b,14) on an expansive stroke of the amplifier (6a,6b,13), yet allows the fin to relax on a downstroke and the fin tip to slide on the friction interface.
2. [Amended] An ultrasonic motor as recited in claim 1 wherein the disc of electro-active material (7,11) is a piezoelectric material having an electrode of a conductive material deposited on each circular face of the disc.
3. [Amended] An ultrasonic motor as recited in claim 1 wherein the disc of electro-active material (7,11) is an electrostrictive material having an electrode of a conductive material deposited on each circular face of the disc.
4. [Amended] An ultrasonic motor as recited in claim 1 wherein the disc of electro-active material (7,11) is a magnetostrictive material excited by an oscillating magnetic field.

5. [Amended] An ultrasonic motor as recited in claim 1 wherein the disc of electro-active material (7,11) is of a multi-layer construction having at least one layer of electro-active material interleaved with layers of conductive electrode material.

6. [Amended] An ultrasonic motor as recited in claim 1 wherein the diaphragm (6a,6b,13) is bonded to the surface of the electro-active disc (7,11) with an epoxy or a metal loaded epoxy.

7. [Amended] An ultrasonic motor as recited in claim 1 wherein the diaphragm (6a,6b,13) is bonded to the surface of the electro-active disc (7,11) with an anaerobic adhesive or modified anaerobic adhesive.

8. [Amended] An ultrasonic motor as recited in claim 1 wherein the diaphragm (6a,6b,13) is soldered or diffusion bonded to the surface of the electro-active disc (7,11).

9. [Amended] An ultrasonic motor as recited in claim 1 wherein a respective diaphragm (6a,6b) is attached to each side of the disc (7) and a single rotor (4) positioned opposite one of the respective diaphragms (6b) turns about an axle(1) which is attached to the other respective diaphragm (6a).

10. [Amended] An ultrasonic motor comprising:  
a disc of electro-active material (7,11) for producing radial vibrations;

at least one flextensional displacement amplifier diaphragm (6a,6b,13) for converting the radial vibrations into vibrations of the diaphragm (6a,6b,13) perpendicular to the plane of the disc (7,11), the diaphragm mounted on the disk;

a rotor (4,4a,4b,14) coupled to the diaphragm, the diaphragm vibrations then being converted into rotary motion via frictional contact at a diaphragm/rotor interface (6b/4,11/14);

wherein a respective diaphragm (6a,6b) is attached to each side of the disc (7) and a respective rotor (4a,4b) is arranged opposite each diaphragm (6a,6b) of which one rotor (4b) is attached to an axle and the other rotor (4a) can slide axially along the axle.

11. [Amended] An ultrasonic motor as recited in claim 1 wherein an axle (1) is attached to the disc (7,11) and one or more rotors (4a,4b,13) turn about said axle (1) on bearings (10,17).

12. [Amended] An ultrasonic motor comprising:

a disc of electro-active material (7,11) for producing radial vibrations;

at least one flextensional displacement amplifier diaphragm (6a,6b,13) for converting the radial vibrations into vibrations of the diaphragm (6a,6b,13) perpendicular to the plane of the disc (7,11), the diaphragm mounted on the disk;

a rotor (4,4a,4b,14) coupled to the diaphragm, the diaphragm vibrations then being converted into rotary motion via frictional contact at a diaphragm/rotor interface (6b/4,11/14);

wherein one or more rotors (4a,4b,14) are held in contact with the oscillating surfaces of the diaphragm by magnetic attraction brought about by the rotors (4a,4b,14) having a remnant magnetic polarization and the diaphragms (6a,6b,13) being made of ferromagnetic materials, such as the metals Iron, Nickel or Cobalt or their alloys.

13. [Amended] An ultrasonic motor comprising:

a disc of electro-active material (7,11) for producing radial vibrations;

at least one flextensional displacement amplifier diaphragm (6a,6b,13) for converting the radial vibrations into vibrations of the diaphragm (6a,6b,13) perpendicular to the plane of the disc (7,11), the diaphragm mounted on the disk;

a rotor (4,4a,4b,14) coupled to the diaphragm, the diaphragm vibrations then being converted into rotary motion via frictional contact at a diaphragm/rotor interface (6b/4,11/14);

wherein one or more rotors (4a,4b,14) are held in contact with the oscillating surfaces of the diaphragm by magnetic attraction brought about by the diaphragms (6a,6b,13), having a remnant magnetic polarization and the rotors (4a,4b,14) being made of ferromagnetic materials, such as the metals Iron, Nickel, or Cobalt or their alloys.

14. [Amended] An ultrasonic motor comprising:

a disc of electro-active material (7,11) for producing radial vibrations;

at least one flextensional displacement amplifier diaphragm (6a,6b,13) for converting the radial vibrations into vibrations of the diaphragm (6a,6b,13) perpendicular to the plane of the disc (7,11), the diaphragm mounted on the disk;

a rotor (4,4a,4b,14) coupled to the diaphragm, the diaphragm vibrations then being converted into rotary motion via frictional contact at a diaphragm/rotor interface (6b/4,11/14);

wherein one or more rotors (4a,4b,14) are held in contact with the oscillating surfaces of the diaphragm by magnetic attraction brought about by an electromagnet winding.

15. [Amended] An ultrasonic motor as recited in claim 1 wherein one or more rotors (4a,4b,14) are held in contact with the diaphragms (6a,6b,13) by one or more springs.
16. [Amended] An ultrasonic motor as recited in 1 wherein the displacement amplifier diaphragm (6a,6b,13) and the disc (7,11) assembly rotates about the rotor (4a,4b,14).
17. [Amended] An ultrasonic motor as recited in claim 1 wherein the displacement amplifier diaphragm (6a,6b,13) and the disc (7,11) assembly is stationary.
18. [Amended] An ultrasonic motor as recited in claim 1 wherein a layer or structure of an elastic material is attached to at least one of the surfaces of the rotor/diaphragm interface (5,5a,5b).
19. [Cancelled]
20. [Amended] An ultrasonic motor as recited in claim 1 wherein the elastic fins (5,5a,5b) make contact at an oblique angle to the surface of the friction interface between the rotating component and the diaphragm (6a,6b,13) of the stationary component.
21. [Amended] An ultrasonic motor as recited in claim 1 wherein the elastic fins (5,5a,5b), which make contact with the friction interface, have one or more curved sections in their length.

22. [Amended] An ultrasonic motor as recited in claim 1 wherein the elastic fins (5,5a,5b), which make contact with the friction interface, have at least two straight sections that are joined in at an angle.
23. [Amended] An ultrasonic motor as recited in claim 1 wherein the diaphragm (6a,6b,13) is dish-shaped having an upset central region.
24. [Amended] An ultrasonic motor as recited in claim 23 wherein the central region is spaced from the plane of the disc.
25. [Amended] An ultrasonic motor as recited in claim 23 wherein the central region (13a) is contained within the plane of the disc.
26. [New] An ultrasonic motor as recited in claim 1 wherein the diaphragm vibrates primarily in an axial direction.
27. [New] An ultrasonic motor as recited in claim 1 wherein the disc has an annular shape.
28. [New] An ultrasonic motor as recited in claim 1 wherein the fins are attached to the rotor.
29. [New] An ultrasonic motor as recited in claim 1 wherein the fins are attached to the diaphragm.